PATENT COOPERATION TREATY

PCT

INTERNATIONAL PRELIMINARY EXAMINATION REPORT

(PCT Article 36 and Rule 70)

Applicant's or agent's file reference hal 5458 PCT	**FOR FURTHER ACTION**	See Notification of Transmittal of International Preliminary Examination Report (Form PCT/IPEA/416)
International application No. PCT/EP 03/01539	International filing date *(day/month/year)* 15.02.2003	Priority date *(day/month/year)* 18.02.2002
International Patent Classification (IPC) or both national classification and IPC B01D53/86		
Applicant HALDOR TOPSOE A/S		

1. This international preliminary examination report has been prepared by this International Preliminary Examining Authority and is transmitted to the applicant according to Article 36.

2. This REPORT consists of a total of 4 sheets, including this cover sheet.

   ☒ This report is also accompanied by ANNEXES, i.e. sheets of the description, claims and/or drawings which have been amended and are the basis for this report and/or sheets containing rectifications made before this Authority (see Rule 70.16 and Section 607 of the Administrative Instructions under the PCT).

   These annexes consist of a total of 1 sheets.

3. This report contains indications relating to the following items:

   - I ☒ Basis of the opinion
   - II ☐ Priority
   - III ☐ Non-establishment of opinion with regard to novelty, inventive step and industrial applicability
   - IV ☐ Lack of unity of invention
   - V ☒ Reasoned statement under Rule 66.2(a)(ii) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement
   - VI ☐ Certain documents cited
   - VII ☐ Certain defects in the international application
   - VIII ☐ Certain observations on the international application

Date of submission of the demand	Date of completion of this report
03.07.2003	12.05.2004
Name and mailing address of the international preliminary examining authority: European Patent Office - Gitschiner Str. 103 D-10958 Berlin Tel. +49 30 25901 - 0 Fax: +49 30 25901 - 840	Authorized Officer Clement, J-P Telephone No. +49 30 25901-325

INTERNATIONAL PRELIMINARY EXAMINATION REPORT

International application No. PCT/EP 03/01539

I. Basis of the report

1. With regard to the **elements** of the international application *(Replacement sheets which have been furnished to the receiving Office in response to an invitation under Article 14 are referred to in this report as "originally filed" and are not annexed to this report since they do not contain amendments (Rules 70.16 and 70.17))*:

Description, Pages

1-19 as originally filed

Claims, Numbers

1-3 received on 01.04.2004 with letter of 31.03.2004

Drawings, Sheets

1/4-4/4 as originally filed

2. With regard to the **language**, all the elements marked above were available or furnished to this Authority in the language in which the international application was filed, unless otherwise indicated under this item.

   These elements were available or furnished to this Authority in the following language: , which is:

   ☐ the language of a translation furnished for the purposes of the international search (under Rule 23.1(b)).

   ☐ the language of publication of the international application (under Rule 48.3(b)).

   ☐ the language of a translation furnished for the purposes of international preliminary examination (under Rule 55.2 and/or 55.3).

3. With regard to any **nucleotide and/or amino acid sequence** disclosed in the international application, the international preliminary examination was carried out on the basis of the sequence listing:

   ☐ contained in the international application in written form.

   ☐ filed together with the international application in computer readable form.

   ☐ furnished subsequently to this Authority in written form.

   ☐ furnished subsequently to this Authority in computer readable form.

   ☐ The statement that the subsequently furnished written sequence listing does not go beyond the disclosure in the international application as filed has been furnished.

   ☐ The statement that the information recorded in computer readable form is identical to the written sequence listing has been furnished.

4. The amendments have resulted in the cancellation of:

   ☐ the description, pages:

   ☐ the claims, Nos.:

   ☐ the drawings, sheets:

5. ☐ This report has been established as if (some of) the amendments had not been made, since they have been considered to go beyond the disclosure as filed (Rule 70.2(c)).

   (Any replacement sheet containing such amendments must be referred to under item 1 and annexed to this report.)

6. Additional observations, if necessary:

V. Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement

1. Statement

Novelty (N)	Yes:	Claims	1-3
	No:	Claims	
Inventive step (IS)	Yes:	Claims	1-3
	No:	Claims	
Industrial applicability (IA)	Yes:	Claims	1-3
	No:	Claims	

2. Citations and explanations

   see separate sheet

Re Item V

Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement

Reference is made to the following document/s/:
D1: US-A-4521387

Document **D1**, which is considered to represent the most relevant state of the art, discloses (col. 2, line 7 - col. 3, line 35) a process for the selective removal of sulfur compounds from gases (especially synthesis gases) containing H2, C0, and CO2 comprising contacting the gases with an absorbent comprising a Cu/ZnO catalyst activated with an H2/N2 mixture from which the subject-matter of claim1 differs in that the gas to be treated contains water.The subject-matter of claim 1 is therefore new (Article 33(2) PCT).

The problem to be solved by the present invention may be regarded as identifying further processes where an adsorbent comprising a Cu/ZnO catalyst activated with an H_2/N_2 mixture is useful.

The solution to this problem proposed in claim 1 of the present application is considered as involving an inventive step (Article 33(3) PCT) for the following reasons: the Cu/ZnO catalyst is well known from the man of the art for catalysing methanol synthesis and the water gas shift reaction in gaseous mixtures containing H2, CO, CO2 and H2O. It looked therefore very inappropriate to consider such gas mixtures to be treated by this Cu/ZnO catalyst for the selective removal of sulphur compounds.
The applicant has shown, that by choosing an appropriate temperature range (under 100^0C), it was possible to avoid those undesired side-reactions.

Claims 2-3 are dependent on claim 1 and as such also meet the requirements of the PCT with respect to novelty and inventive step.

New claims

1. A process for the selective removal of sulphur compounds from synthesis gas containing at least 5% carbon monoxide, at least 5% hydrogen and at least 0.5% carbon dioxide and containing water in a concentration up to saturation at a pressure of at least 15 bar comprising contacting the synthesis gas at a maximum contact temperature of 100°C with an absorbent comprising Cu/ZnO compounds and activated with a reducing gas.

2. Process of claim 1, wherein the sulphur compounds comprise H_2S and COS.

3. Process according to any one of the preceding claims, wherein the synthesis gas contains H_2S in an amount effective for suppression of metal dusting of metals in contact with the synthesis gas within a temperature range between 300°C to Boudouard temperature of the synthesis gas.